

The following article was written in December 2019 before the Covid-19 pandemic. It is a very brief summary of a 300 page detailed report "Non-metallurgical Bauxite & Alumina: Global Industry, Markets and Outlook" published by Roskill and largely compiled by TAK. Obviously things have changed in the markets because of the unforeseen consequences of the Covid-19 pandemic. The historic structure of the industry and production, consumption, trade and pricing trends are still perfectly valid. Long term forecast trends are also still valid. However, there are effects from the pandemic that will mean that there will be a decline in supply and demand before the industry returns to normal. How long that decline lasts and how fast industry and the world economy in general recovers is very uncertain. Rapid development of an effective vaccine could lead to a rapid recovery and potentially a temporary surge to fulfil pent up demand held back during the pandemic. Without that, some feel that the world could face a protracted recessionary period with slow recovery as the virus remains widespread despite the best efforts of Governments.

The effects on different sectors will vary. Water treatment chemicals use for alumina hydrate are likely to have fairly steady demand because it is a fairly mature market with a large proportion of sales to municipalities for potable water treatment. In contrast, demand for alumina hydrate in the production of aluminium fluoride used in aluminium smelting is likely to be weak with reductions in demand for aluminium metal already evident. For calcined alumina and calcined bauxite, demand in refractories has been falling mainly because of reductions in the production of steel, the main consuming industry for refractories. Most other industries consuming non-metallurgical bauxite and alumina are likely to see declines at least in the short term until there is a post pandemic recovery. Once that recovery has gained momentum the industry is likely to revert to historical trends, possibly with a period of above trend growth until the growth trends revert to a more normal trend line.

Non-metallurgical alumina market brief

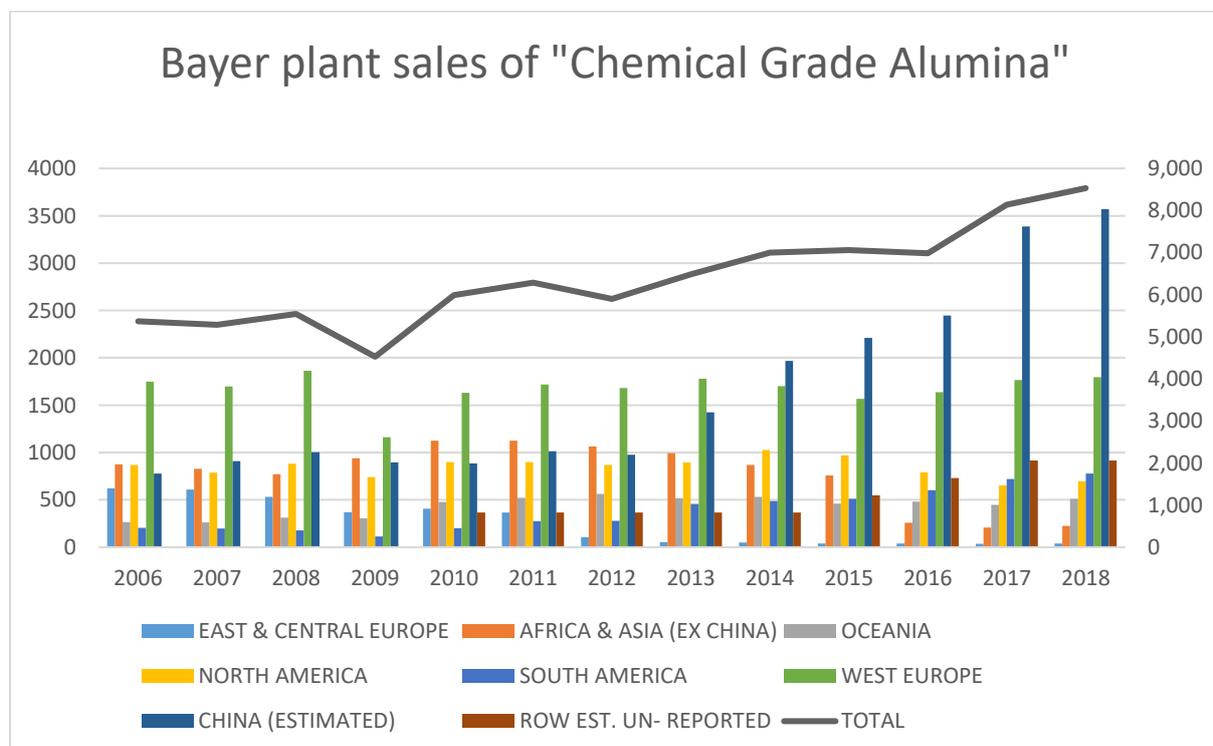
The market for non-metallurgical grade of alumina represents only about 6% of total alumina production, amounting to about 7 million tonnes. The supply chain starts primarily with alumina from Bayer alumina plants, although there is production of much smaller volumes of high added value ultra-high purity grades from other processes. Alumina hydrate from Bayer plants is then used to make products such as water treatment chemicals, aluminium fluoride, flame retardant fillers and zeolites. Calcined alumina from Bayer plants can be used as feedstock for the production of specialty grades of alumina including hard calcined alumina, tabular alumina and white fused alumina for refractories, ceramics, catalysts, ceramic fibres and abrasives.

Markets were disrupted in 2018 due to the embargo on production at Alunorte in Brazil, which had become a major supplier of alumina hydrate to both Japan and the USA, cutting output by 50%. Threats of sanctions against Rusal and a 6 week-long strike at some plants in Australia added to the supply tightness and prices escalated. Supply is back to more normal levels in 2019, but demand in some sectors is subdued and prices of wet hydrate and feedstock grades has declined to levels of 2017 or below.

World alumina production

The start of the value chain is production of standard alumina hydrate or calcined alumina from Bayer plants. Production of what is termed "Chemical Grade" alumina is recorded by the International Aluminium Association (IAI) combining the alumina content of hydrate sold with the sale of calcined grades for non-metallurgical applications. Production levels are shown in figure 1. It should be noted that this represents recorded sales rather than production.

Figure 1



Source: "Non-metallurgical Bauxite & Alumina: Global Industry, Markets and Outlook, 2019" Roskill Information Services (and IAI)

Growth over the period shown was close to 4% CAGR fuelled by recent large growth in China. Growth outside of China was only 0.65% CAGR indicating the greater maturity of the market especially in the hydrates sector. Chinese production overtook that of Western Europe in 2014 and has continued to grow. In recent years the IAI has also added estimates of unreported production in the rest of the world. That may account for some of the very low production recorded for Eastern and Central Europe, which is primarily from Russia and is substantially less than would be expected. In 2018 it was only 38,000 tonnes but as much as 500,000 tonnes is estimated to have been used in the production of water treatment chemicals and the Boksitogorsk white fused alumina plant alone would require about 70,000 tonnes annually.

In terms of the types of products sold, it is estimated that of the 8.53 million tonnes total sales 6.45 million tonnes gross weight of alumina hydrate were sold in 2018 equivalent to 4.2 million tonnes on a 100% alumina basis, and 4.3 million tonnes of feedstock calcined alumina from Bayer plants was sold.

Commodity alumina markets

In the case of commodity hydrates, markets have tended to be regional because of the added cost of shipping water representing more than one third of the gross weight, whereas it is the alumina content that is important for many consumers. The big exception has been large scale shipments of hydrates from Brazil, to Japan and more recently to the USA after the closure of two Bayer plants in the USA. In early 2018, an embargo that restricted production to 50% of capacity at the Alunorte operation in Brazil resulting in force majeure being declared caused significant shortages of hydrate particularly in the USA. US consumers had to find alternatives from sources such as other Brazilian producers, Greece, Jamaica and increased capacity for hydrate filtering and drying at the Gramercy operation of Noranda in Louisiana. Japanese consumers found alternatives from Australia and even China, which for a short term became an exporter taking advantage of high prices.

Flame retardant and filler grades of hydrates, in which the water of crystallisation is an integral part of the final product, have considerable added value and are traded much more widely internationally. The main centres of production for re-precipitated grades are in Germany, the USA and Japan as well as in China, and white/near white ground Bayer hydrates are produced in Canada, Germany France and India.

Specialty calcined grades cover a wide range of products including hard calcined alumina, tabular alumina and white fused alumina. Just from the four or five largest producers there are as many as 100 grades on offer differing in levels of impurities such as soda, degree of calcination, sintering or fusing, which influences the crystal form and size, grain size and surface area. Main production countries include France, Germany, the USA, China, Japan, Russia, India, Austria and Slovenia.

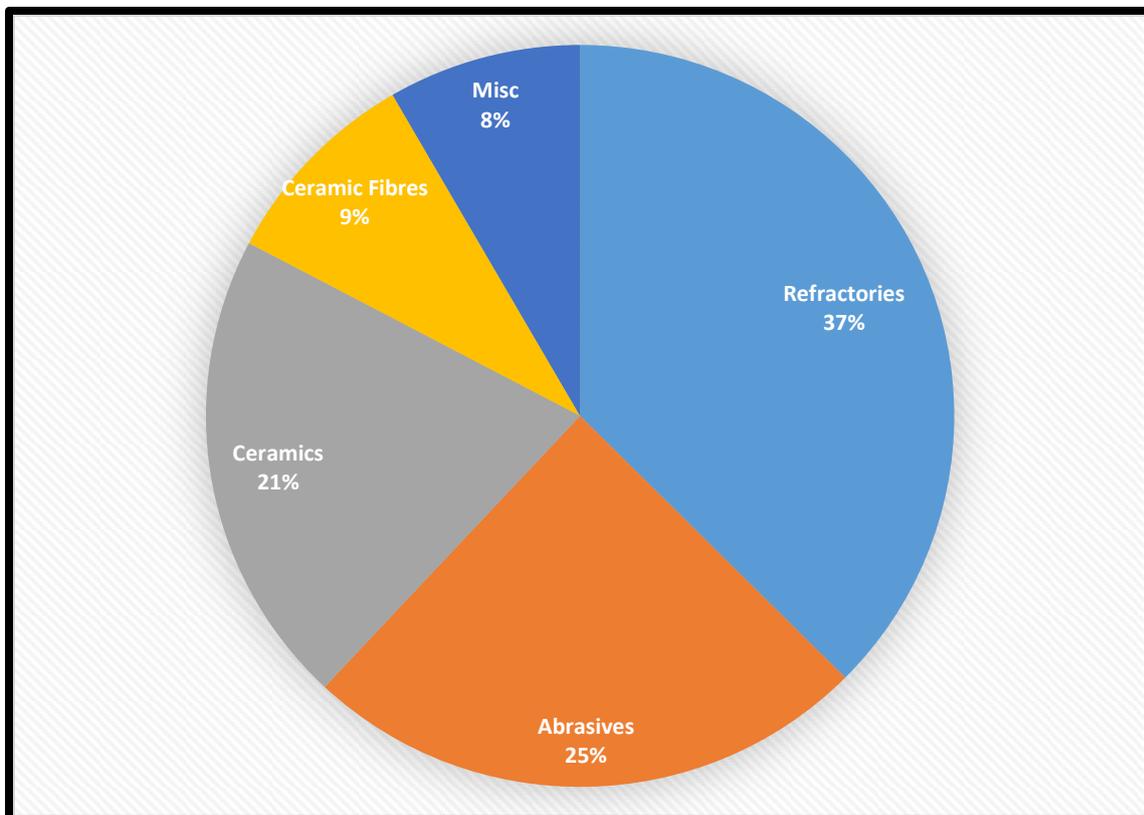
While there is international trade in the commodity grades of both hydrates and calcined grades, much of the trade is regional. Europe is essentially self-sufficient. Excluding some exceptional circumstances during tight supply in 2018, the main exception to inter regional trade in hydrates is from Brazil to Japan and the USA. Australia, and for a time China, supplied much of the Asian demand not derived from Brazil. Calcined alumina trade also tends to be regional. However for higher value added grades such as tabular alumina and white fused alumina, some very special

grades of calcined alumina and the higher value re-precipitated grades of alumina hydrate for flame retardants there is considerable international trade. Exports are mainly from countries such as Germany, France and Japan.

Consumption patterns

The largest use for calcined alumina is in refractories with direct use combined with tabular alumina, white fused alumina, ceramic fibres, spinel, and calcium aluminate cement accounting for about two thirds of consumption. Ceramics is the next largest use, ranging from fairly low tech grinding balls to high specification technical ceramics. Other uses include WFA used in abrasives, calcined alumina in polishing compounds and for the manufacture of catalysts.

Calcined alumina consumption by use – Total 4.3 Million tonnes

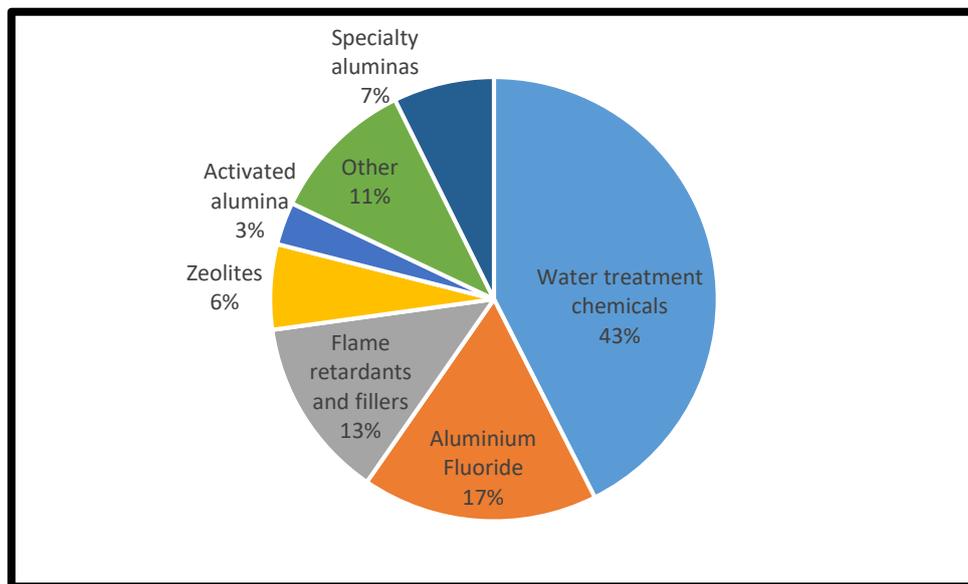


Source: "Non-metallurgical Bauxite & Alumina: Global Industry, Markets and Outlook, 2019" Roskill Information Services

The largest use for alumina hydrate is in the manufacture of water treatment chemicals, primarily aluminium sulphate and polyaluminium chloride, although some sodium aluminate is also used. Aluminium fluoride used as a flux in aluminium metal production is the second largest use, followed by flame retardants and fillers including both ground white hydrates and re-precipitated grades. Zeolites manufacturing has been in decline because of a trend away from their use in detergents,

which is reaching maturity. There is some alumina hydrate subsequently calcined to specialty calcined grades notably in Germany and Japan.

Alumina hydrates consumption by use – total 6.45 million tonnes gross weight



Source: "Non-metallurgical Bauxite & Alumina: Global Industry, Markets and Outlook, 2019" Roskill Information Services

While many of the metallurgical alumina open market contracts are now linked to an alumina index, that does not tend to be the case for non-metallurgical grades. Contracts tend to be negotiated for a year at a time or sometimes multiple year contracts, although in the exceptional year of 2018 with disruption to supplies there were an unusual amount of spot purchases to make up for lost supplies from disrupted production.

Roskill's Non-metallurgical Bauxite & Alumina: Outlook to 2029, 10th Edition report was released in December 2019 and includes analysis of recent industry trends in supply, demand, trade and prices, as well as providing forecasts to 2029 and profiles of the main producers.

<https://roskill.com/market-report/non-metallurgical-bauxite-alumina/>